

SECTION 07 4113

METAL ROOF PANELS

LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the ESM Architectural POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Specification developed for ML-3 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural standing seam metal roofing.
- B. Structural lapped seam metal roofing.
- C. Architectural standing seam metal roofing.
- D. Architectural batten seam metal roofing.
- E. Base material corrosion resistant finish.
- F. Underlayments and substrates.
- G. Associated flashings, gaskets and sealant.

1.2 SUBMITTALS

- A. Submit the following in accordance with Section 01 3300, Submittal Procedures:
 - 1. Catalog Data: Submit manufacturer's product specifications, as applicable to materials and finishes for each component and for complete roofing installation.
 - 2. Installation Instructions: Manufacturer's instructions including special procedures for roofing penetrations, flashing, and perimeter conditions requiring special attention.
 - 3. Shop Drawings: Submit complete shop drawings and erection details showing methods of erection, elevations and plans of roof panels, sections and details, anticipated loads, flashings and all other accessories,

interfaces with all related work of other trades, and proposed identification of component parts and their finishes.

4. Samples: Submit one sample of roof panel, including clips, fasteners and battens if applicable. Submit two color chip samples in color selected.
5. Certifications: Submit certification that roofing assembly meets specified loading requirements and has been pre-tested to provide specified resistance to wind uplift, and air and water infiltration.
6. Warranty: As specified herein.

1.3 QUALIFICATIONS

A. Metal Roofing Manufacturer

1. Company specializing in manufacturing products specified in this section.
2. Supply a list of projects, completed in Southwest, where specified material has been in place and performing successfully for a period of not less than 5 years.

B. Applicator

1. Company specializing in performing the Work of this section with documented experience and "certified" by material manufacturer as an applicator and maintenance company. As a minimum, Applicator shall have successfully completed 5 projects using the specified or similar materials. Applicator shall provide LANL's Contract Administrator with a written record identifying these projects with the name and address of purchasers of the service and location of work performed, if requested.

1.4 REGULATORY REQUIREMENTS

A. Underwriter's Laboratories, Inc. (UL): Class A Fire Hazard Classification.

Wind Resistance: Per ESM Chpt 4, Sect. B30: Design roof systems to comply with FM Class 1-90 Windstorm Resistance criteria or their equivalent. Calculate wind pressures on roofing based on most conservative of the criteria in FM 1-28 and IBC/ASCE 7 -- see ESM Structural Chapter for additional requirements. NOTE: Wind uplift may exceed I-90 requirements within 500 feet of an adjacent canyon. Uplift to be calculated as though on a building with a total height of the total canyon depth plus number of building stories.

B. Factory Mutual Engineering & Research Corporation (FM): Roof Assembly Classification of Class 1 Construction, wind uplift requirement of [I-90], per FM Construction Bulletin 1-28.

C. International Building Code: ICBO IBC-2003.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 6000, Product Requirements.
- B. Handle weather sensitive materials as required by manufacturer. Permanently remove from job materials not handled per manufacturer's requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing materials during inclement weather.
- B. Do not apply roofing materials to damp or frozen surfaces.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.
- D. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- E. Prevent contact with materials causing discoloration or staining.

1.7 QUALITY ASSURANCE

- A. Perform Work per SMACNA Architectural Sheet Metal Manual and NRCA Roofing and Waterproofing Manual where details are not provided or identified in the Contract documents.
- B. Air Infiltration: Limit air leakage through roof assembly to 0.03 cfm/sq ft of wall area, measured at reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E283.
- C. Water Leakage: None, when measured per ASTM E331 with test pressure of 6.24 psf.
- D. Perform Work per manufacturers written requirements unless more stringent requirements are specified in the Contract documents.
- E. Complicated or high risk conditions of installation shall require a pre-installation conference at the job site.

1.8 FIELD CONDITIONS

- A. Verify field measurements prior to fabrication.
- B. Verify field conditions prior to commencement. Commencement of construction indicates acceptance of conditions.

1.9 WARRANTY

- A. Furnish [20] [] year manufacturer warranty for sheet metal roofing against structural failure, fastener seal loss, corrosion and water penetration.

- B. Furnish [20] [] year manufacturer warranty for metal finish against fading, chipping, chalking, and blistering.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, Substitution Procedures.

2.2 MANUFACTURED SHEET METAL ROOFING

- A. Manufacturers:

1. Atlas International, Inc.
2. Atlanta Metal Products
3. Fabral
4. MCB
5. Metal Fab Manufacturing, L.L.C.
6. Roll Com

- B. Structural Standing Seam Metal Roofing: Factory formed metal roofing panel system with concealed fasteners.

Structural Standing Seam Metal Roofing is limited to 1 to 12 (8.33%) slope or greater.

1. Panel Materials: Pre-finished galvanized or galvalume steel sheet metal 24 gage (minimum) thickness.
2. Panel Width: Nominal 12 inches.
3. Panel Profile: manufacturer's standard profile.
4. Seam Type: Sanding seam as selected.
5. Color: [] .

***** [OR] *****

- C. Structural Lapped Seam Metal Roofing: Factory formed metal roofing panel system with exposed fasteners.

Structural Lapped Seam Metal Roofing is limited to 2 to 12 (16%) slope or greater.

1. Panel Materials: Pre-finished and galvanized or galvalume steel sheet 24 gage (minimum) base metal thickness
2. Panel Width: Nominal [32inches] minimum [36 inches] maximum.
3. Panel Profile: [Corrugated] [Trapezoidal] [Box ribbed].
4. Panel Depth: Nominal 3/4 inches minimum.
5. Seam Type: Lapped.
6. Color: [from manufacturer's standards].

***** [OR] *****

- D. Architectural Standing Seam Metal Roofing: Factory formed metal roofing panel system with concealed fasteners.

Architectural Standing Seam Metal Roofing is limited to 1 to 12 (8.33%) slope or greater.

1. Panel Materials: Pre-finished and galvanized or galvalume steel sheet 24 gage (minimum) base metal thickness.
2. Panel Width: Nominal 12 inches minimum.
3. Panel Profile: [].
4. Seam Type: Standing seam snap interlocked with snap on cover.
5. Seam Height: 1-1/2 inches.
6. Color: [from manufacturer's standard].

***** [OR] *****

- E. Architectural Batten Seam Metal Roofing: Factory formed metal roofing panel system with concealed fasteners.

Architectural Batten Seam Metal Roofing is limited to 2 to 12 (16%) slope or greater.

1. Panel Materials: Pre-finished and galvanized or galvalume] steel sheet 24 gage (minimum) base metal thickness.

2. Panel Width: Nominal 12 inches minimum.
3. Panel Profile: [from manufacturer's standard].
4. Seam Type: Batten seam snap interlocked with snap on cover.
5. Batten Size: Nominal 1 x 2 inches in height x width.
6. Color: [manufacturer's standard].

2.3 SHEET METAL MATERIALS

A. Pre-Finished Galvanized Steel Sheet: ASTM A755 coil coated.

1. Base Metal: ASTM A653, zinc coating.
2. Exposed Finish: Silicone polyester or acrylic or electrolytic powder coating.

***** [OR] *****

3. Exposed Finish: Minimum three coat fluoropolymer coating with minimum 70 percent polyvinylidene fluoride resin.

***** [OR] *****

4. Unexposed Finish: Manufacturer's standard.

*****[OR]*****

B. Galvalume Steel Sheet: ASTM A792; aluminum-zinc alloy coating.

***** [OR] *****

C. Pre-Finished Galvalume Steel Sheet: ASTM A755 coil coated.

1. Base Metal: ASTM A792, aluminum-zinc alloy coating.
2. Exposed Finish: Silicone polyester or acrylic or electrolytic powder coating.

***** [OR] *****

3. Exposed Finish: Minimum three coat fluoropolymer coating with minimum 70 percent polyvinylidene fluoride resin.
4. Unexposed Finish: Manufacturer's standard.

2.4 UNDERLAYMENT/EAVE PROTECTION

A. Roll Roofing: Comply with Section 07 5216, Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing.

- B. Underlayment/Eave (Ice Dam) Protection: Sheet barrier of rubberized asphalt bonded to sheet polyethylene, 40 mil total thickness, with strippable treated release paper.

2.5 FABRICATION

- A. Form section shape as specified in Contract documents, accurate in size, square, and free from distortion or defects.
- B. Fabricate fascia, trim, flashing, and other metal components from same material and color as metal roof panels. Provide exposed metal surfaces with same finish as exposed face of metal roof panels.
- C. Fabricate cleats of same material as sheet, to interlock with sheet.
- D. Fabricate starter strips of same material as sheet, continuous, to interlock with sheet.
- E. Form pieces in longest practical lengths or in single length sheets where possible.
- F. Hem exposed edges on underside 1/2-inch; miter and seam corners.

Due to high coefficient of expansion, metal should not be lock seamed where thermal induced movement of metal is restrained.

- G. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Wood and Metal Deck Substrate:
 - 1. Inspect roof deck to verify deck is clean and smooth, fully fastened, free of depressions, waves, or projections, and properly sloped to drains, valleys or eaves.
 - 2. Verify deck is dry and substrate joints are solidly supported and fastened.
 - 3. Verify wood nailers are installed and correctly located.
- B. Structural Framing Substrate:

1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped to drains, valleys or eaves.
2. Verify damaged shop coatings are repaired with touch up paint.
- C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof, or their flashings are solidly set, reglets are in place, and nailing strips located.
- D. Verify roofing termination and base flashings are in place, sealed, and secure.
- E. Verify insulation is installed and ready for roof application. Follow manufacturer's installation instructions regarding thermal blocks or other associated materials.

3.2 PREPARATION

- A. Wood and Metal Deck Substrate:
 1. Fill knotholes and surface cracks with latex filler at areas of bonded eave protection.
 2. Broom clean deck surfaces under eave protection and underlayment.
- B. Back paint all concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing asphalt based paint to minimum dry film thickness of 15 mil.
- C. In re-roofing applications metal roofing is not allowed to over lay any other material but metal. Remove all other roofing materials/membranes.

3.3 INSTALLATION OF EAVE PROTECTION

- A. Apply 4 inch wide band of premium rubberized asphaltic cement over deck flange of eave edge flashings, and embed 18 inch wide strip of eave protection sheet. Place starter strip with eave edge flush with face of flashings. Secure in place. Lap ends minimum 6 inches.
- B. Apply plastic cement at rate of approximately 1- 1/4 gallons per 100 square feet over starter strip.
- C. Starting from lower edge of starter strip, lay additional 36 inch wide strips of eave protection sheet in plastic cement, to produce two ply membranes. Weather lap plies minimum 19 inches and nail in place. Lap ends minimum 6 inches. Stagger end joints of each consecutive ply.
- D. Extend eave protection sheet minimum 4 feet upslope beyond interior face of exterior wall.
- E. Place double width eave protection sheet centered over valley, hips and ridges.
- F. Place double width eave protection sheet along gable, parallel to gable edge.

3.4 INSTALLATION OF UNDERLAYMENT

- A. Apply underlayment over entire roof area in single layer fastened to substrate.
 - 1. Install underlayment laid perpendicular to slope.
 - 2. Weather lap edges 6 inches and nail in place.
 - 3. Stagger end joints minimum 24 inches.

3.5 INSTALLATION OF STANDING SEAM METAL ROOFING

- A. Install furring as required to support roof panel side laps and receive fasteners as per manufacturer installation requirements.
- B. Install roofing panels with long dimension perpendicular to eaves.
- C. Install roofing panels beginning at eaves. Lap ends minimum 6 inches.
- D. Align transverse lapped joints of roofing sheets.
- E. Install clips and walkway or accessory clips/mounts as required to secure roof panels without deforming roof panels.
- F. Install rope caulking or sealant as per roof system manufacturer.
- G. Machine form-standing seam between adjacent roofing panels. Hand form joints where machine forming is not possible.

***** [OR] *****

- H. Snap standing seam cap in place over roofing panel vertical legs. Miter seam cap at changes in direction. Cut and trim end cap to conceal batten space at roofing panel terminations.
- I. Terminate roofing panels with sheet metal trim and flashing for watertight installation. Close and conceal openings between roofing panels, panel seams, and roof substrate with mechanically fastened manufacturer supplied closure strips.
- J. Seal metal joints watertight.

3.6 INSTALLATION OF LAPPED SEAM METAL ROOFING

- A. Install furring as required configured to continuously support roof panel side laps and receive fasteners.
- B. Install roofing panels with long dimension perpendicular to eaves.
- C. Install roofing panels beginning at eaves. Weather lap ends minimum 6 inches.
- D. Align transverse lapped joints of roofing sheets.

- E. Terminate roofing panels with sheet metal trim and flashing for watertight installation. Close and conceal openings between roofing panels, panel seams, and roof substrate.
- F. Seal metal joints watertight. Continuously seal lap joints and flat laps with metal roof manufacturer supplied "coil rope" caulk. Seal panel end profiles with manufacturer supplied self-adhering foam gaskets. Gaskets upon installation shall have a silicone adhesive added to topside of gasket to prevent gasket displacement.
- G. Lap roofs either new or retrofit to have sheathing removed for 2 inches down from ridge to allow for continuous ridge venting as supplied by roof manufacturer.
- H. Seal exposed panel end terminations with manufacturer supplied foam rubber gaskets. Gaskets shall have factory applied adhesive strips. Gaskets upon installation shall have a silicone adhesive added to topside of gasket to prevent gasket displacement.

3.7 INSTALLATION OF BATTEN SEAM ROOFING.

- A. Install roofing panels with long dimension perpendicular to eaves.
- B. Install roofing panels beginning at eaves. Weather lap ends minimum 6 inches.
- C. Align transverse lapped joints of roofing panels.
- D. Install clips to secure roof panels as well as any accessory or walkway required clips without deforming roof panels.
- E. Install blocking between vertical legs of roofing panels when required by roofing manufacturer to maintain batten profile.
- F. Snap batten cap in place over roofing panel vertical legs. Miter batten cap at changes in direction. Form or cut and trim end cap to conceal batten space at roofing panel terminations.
- G. Terminate roofing panels with sheet metal trim and flashing for watertight installation. Close and conceal openings between roofing panels, panel seams, and roof substrate with mechanically fastened, manufacturer supplied closure strips.
- H. Seal metal joints watertight.

3.8 INSTALLATION OF SOFFIT PANELS

- A. Install perimeter trim, level and aligned perpendicular with fascia.
- B. Install soffit panels to form flat, flush surface.
- C. Fit soffit panels in single length between perimeter trim. Secure panels to soffit framing or substrate.

- D. Install perforated soffit panels at locations indicated on Drawings alternating with solid panels.
- E. Adjust panels for uniform joints.

3.9 INSTALLATION OF FLASHING

- A. Install reglets or termination bars in accordance with Section 07 6200, Sheet Metal Flashing and Trim.
- B. Insert flashing into reglets to form tight fit. Secure in place with plastic wedges at maximum 6 inches on center. Pack remaining spaces with stainless steel wool. Seal flashings into reglets with approved sealant.
- C. Place eave edge and gable edge metal flashings tight to fascia. Weather lap joints 2 inches and seal with approved sealant. Secure flange to substrate.
- D. All surfaces perpendicular to roof slope over 12 inches wide require a cricket.
- E. Form valleys with sheet metal not exceeding 10 feet in length. Lap joints 6 inches in direction of drainage. Extend valley sheet minimum 12 inches under roofing sheets on roofs greater than 5 on 12 pitch. For roofs of 4 on 12 pitch or less extend 16 inches. Valley flashing shall have a 3/4 inch inverted "V" flow breaker at center of and parallel in direction to the valley. Extend valley a minimum quantity of inches required to assure that capillary flow back to the fascia is not possible, but not less than 1 inch.
- F. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- G. Secure flashing exposed edges with cleats a maximum 24 inches on center.
- H. Apply premium asphaltic rubberized plastic cement compound between metal flashings and felt flashings.
- I. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- J. Seal metal joints watertight with the following sealant:
 - 1. Urethane for exposed spaces.
 - 2. Silicone for concealed spaces.
 - 3. Polyisobutylene with backer rod for joints requiring large movement (i.e., 500 percent).
 - 4. Manufacturer supplied "rope caulk" for linear lap joints.

3.10 FALL PROTECTION

- A. Ladder Stops: Provide [number] ladder stop/tie-off devices at eave/gutter area to prevent temporary ladders from sliding laterally until tied-off, and to provide a point for ladder tie-off. Device (e.g., bracket, strap) shall be of material and construction visually and galvanically compatible with roof system, and non-rusting. Roof access locations will be determined by LANL Facility Manager.
- B. Anchorage: Provide anchorage to allow securing of a lifeline when roof-mounted equipment is either within 10 feet of any unguarded roof edge or for roof with a 3-in-12 slope or greater. The anchor must be able to hold a load of 5000 pounds. Anchor location(s) must be approved by the LANL Facility Manager.

END OF SECTION

Do not delete the following reference information:

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 4113 Rev 1, dated March 6, 2006.